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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to surgical instruments, and more particularly relates to a handle for an endoscopic or laparoscopic surgical instrument having a novel locking mechanism which is internally disposed within the handle to provide for incremental positioning of the jaw members of a surgical instrument in relation to each other. The positioning and subsequent release of the jaw members is accomplished through the provision of a trigger mechanism disposed within the handle. An instrument in accordance with the pre-characterising part of claim 1 below is disclosed in US-A-4 614 187.

2. Discussion of the Prior Art

In the prior art, various endoscopic surgical instruments are disclosed which utilize generally complex mechanisms for opening and closing handle members which actuate jaw members to facilitate use of the device at a surgical site. Many devices provide an intricate construction in which a linkage mechanism for opening and closing the jaws requires numerous moving parts, while a sliding arrangement is provided between two extended rod members to activate the linkage mechanism in response to movement of the handle members. In addition, pivoting of the handle members in many cases causes an unwanted radial torquing force on the rod which requires additional space to be provided in the handle members to accommodate the deflected radial movement of the rod.

Furthermore, it is often necessary for the surgeon, or an assistant, to maintain a constant force on the handles to keep the jaw mechanism closed in the event that the instrument is a grasping or gripping device such as forceps, needle holders, or retractors. This limits the surgeon's range, and in the case of an assistant, often requires additional personnel to be present in the operating room, thus restricting movement in an already confining location. To alleviate this problem, it has been known to provide locking mechanisms on the handles of the surgical instruments which allow the surgeon to lock or clamp the jaw members in place to free his hands to operate additional instruments during the course of the operation. Furthermore, this frees the surgical assistant to support the surgeon and eliminates the need for additional assistants. Typical locking devices include arm members which extend between the handles so that a series of ridges or ribs on each arm member engage corresponding ridges on the opposite arm to lock the handles in position. Bending one arm in relation to the other releases the locking mechanism.

A disadvantage associated with these devices concerns the release of the locking mechanism for subsequent movement of the jaw members to remove or reposition the instrument. Generally, the arm members of locking mechanisms are constructed of a resilient material, such as stainless steel or rigid plastic, and the locking forces which hold the arm members in engagement are generated by the natural flexing and biasing of the material of which the arm members are constructed. To release the locking mechanism, the arms must be disengaged by overcoming the locking forces of the arms. Typically, this is accomplished by manually flexing the arms away from each other, necessitating the use of two hands, one to grasp the instrument, and the other to forcibly move the arm members. This, of course, requires the surgeon (or assistant) to cease what he is doing and release the mechanism, thus reducing the effectiveness of the surgeon during the operation, particularly in an emergency situation.

Finally, locking mechanisms located on the handles require special care in sterilization, packaging and storage, as well as in normal handling in the operation room. Dirt and debris may clog the ribs of the locking mechanism thus reducing its effectiveness, and damage to the ribs during storage or packaging may destroy the ribs, rendering the locking mechanism useless.

U.S. Patent No. 1,452,373, to Gomez discloses a typical locking mechanism for a surgical instrument, in which a plurality of ribs are provided on an extension of the handle member which engage a similar rib member on the opposite handle. Once engaged, the handles must be moved away from each other perpendicular to their longitudinal axis to disengage the locking mechanism to release the jaw mechanism.

U.S. Patent No. 4,896,661, to Bogert et al. discloses a surgical instrument having a ratchet mechanism positioned on the handle members which includes a curved rack member attached to one handle member which passes through a slot in the other handle member. A releasable pawl member is provided on the second handle to engage the rack member and provide a means for releasing the ratchet.

U.S. Patent No. 4,935,027, to Yoon discloses a surgical instrument having a ratchet mechanism positioned between the handle members. A rack member is provided which extends from one handle and passes through a slot in the second handle to lock the handles in place. Pivoting the rack member away from corresponding grooves in the slot will release the ratchet mechanism.

U.S. Patent No. 4,428,374, to Auburn discloses a surgical instrument having means for positioning and holding the handle members in relation to each other. A rack member is provided on one handle member which extends through a slot in the second handle member in which a releasable pawl mechanism is provided to engage and disengage the rack member.

The novel surgical instrument pursuant to the present invention obviates the disadvantages encountered in the prior art and provides a precise instrument which is easy to manufacture and efficient to use, which eliminates the need for a external locking device and provides for one hand operation of the surgical instrument through manipulation of the opposing handles and a trigger mechanism. The instrument of the present invention incorporates many features which are of use to the surgeon during an operation, including a means for rotating the jaws in relation to the handle if desired, while maintaining a lightweight construction in an easy to handle device in which all of the features may be operated with one hand. Furthermore, the features are positioned so as to provide a maximum line of sight for the surgeon without obstructing the view to the surgical site.

SUMMARY OF THE INVENTION

The present invention is in accordance with the characterising part of claim 1 below, and provides a novel endoscopic or laparoscopic surgical device which incorporates many features necessary for endoscopic or laparoscopic surgical procedures, and provides a lightweight and easy to use device which may be operated with one hand. The device includes an internal locking mechanism located preferably within the handle mechanism which provides for the locking of the jaws of the instrument in any position necessary for performing the surgical procedure. The locking mechanism is activated by and deactivated by a trigger member situated on the handle assembly by pulling on the trigger member. The device is simple to manufacture, and may incorporate any one of a series of jaw mechanisms for various surgical procedures. The device is a high precision instrument in which many moving parts normally associated with such a device are eliminated, thus reducing instances of mechanical failure requiring expensive repair or ultimate destruction of the instrument.

The endoscopic or laparoscopic surgical instrument employing the locking mechanism of the present invention essentially comprises of a handle assembly, and elongated body assembly, a tool mechanism at an end of the body assembly remote from the handle assembly, and the locking mechanism and associated trigger member within the barrel portion of the handle assembly. The trigger extends out of the barrel portion of the handle assembly adjacent the pivoting and the stationary handle portions of the handle assembly. The body assembly consists of an outer tubular member and an inner rod member which coaxially passes within the outer tubular member. The rod member is attached to the pivoting handle, through the provision of a rotatable connecting means on the pivoting handle. As the handle moves, the connecting means rotates to allow the inner rod to move longitudinally in the outer tube with minimal radial deflection, thereby allowing for the reduction of the required internal spacing between the outer tube and inner rod to result in a more compact and streamlined instrument. Furthermore, unwanted torquing forces are eliminated at the connecting means thus minimizing the possibility of mechanical breakdown of the instrument at the connection between the pivoting handle and the movable inner rod. The tubular member is secured in a conventional manner to the barrel portion which extends into the stationary handle. As the pivoting handle moves, the rod member slidably reciprocates within the outer tube member.

Attached to a distal end of the body assembly is the tool mechanism which opens and closes in response to movement of the pivoting handle in relation to the stationary handle. The tool mechanism may comprise a pair of jaw members wherein one or both jaw members open and close to perform various endoscopic or laparoscopic surgical procedures. The jaw mechanism includes, but is not limited to, a scissors device, a dissecting device, a grasping device, a retractor device, and like mechanisms.

The present invention provides a locking mechanism in the form of a trigger to arrest movement of the inner rod to incrementally position the jaws in relation to each other. The locking mechanism is provided on the barrel portion of the handle assembly and is positioned so that the surgeon may activate the lock mechanism with a single hand. Preferably, the trigger moves linearly to minimize the required spacing within the handle.

Alternately, the locking mechanism of the present invention provides a trigger mechanism which may be operable by a pivoting motion of the trigger as opposed to a linear motion of the trigger. In a further embodiment, the locking mechanism is entirely internal, such that the trigger itself is eliminated.

The present invention also includes the provision of a rotatable knob on the outer tubular member to allow the body assembly and jaw mechanism to rotate to position the jaws at desired angles to the longitudinal axis during the surgical procedure. Preferably, the rotatable knob is secured to

the outer tube and positioned in a slot which passes through the barrel portion of the stationary handle, so that a surgeon may rotate the knob, and consequently the body assembly and jaw mechanism, through the use of his thumb while he is holding the stationary handle with his fingers. This frees the surgeon's other hand to simultaneously operate another instrument during surgery.

The present invention may also feature a connection port to provide the device with electrocautery capabilities. A connection port allows for the connection of a suitable jack member to be inserted into the device. The outer tube of the body assembly is provided with electrical insulation, such as heat shrink tubing, which extends a substantial portion of the length of the outer tube. In this embodiment, the handle is molded of plastic material to provide electrical insulation for the user.

In the preferred embodiment, all the above features are incorporated into a single endoscopic and laparoscopic surgical instrument, so that the instrument has electrocautery, rotational, and locking capabilities. However, the instrument of the present invention is constructed with at least the locking capabilities to provide for the locking and unlocking of the surgical instrument during a surgical procedure.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing objects and other features of the invention will become more readily apparent and may be understood by referring to the following detailed description of illustrative embodiments of the endoscopic or laparoscopic surgical instruments having an internal locking mechanism, taken in conjunction with the accompanying drawings, in which:

Figure 1 illustrates a perspective view of a first embodiment of an endoscopic or laparoscopic surgical instrument incorporating a locking mechanism of the present invention;

Figure 2 illustrates an exploded perspective view of the instrument of Figure 1 showing in detail the locking mechanism according to the present invention;

Figure 3 illustrates a side plan cut-away view of the handle assembly containing the locking mechanism of the embodiment of Figure 1;

Figures 4a-4e illustrate a top plan view of the trigger and latch release spring of the embodiment of Figure 1 in operation from activation through release of the locking mechanism;

Figure 5 illustrates a side plan view and partial cut-away view of the trigger of the embodiment of Figure 1;

Figure 6 illustrates a side plan view of the latch release spring of the present invention;

Figure 7 illustrates a perspective view of an endoscopic or laparoscopic surgical instrument possessing the locking mechanism according to a second embodiment of the present invention;

Figure 8 illustrates an exploded perspective view of the instrument of Figure 7 showing in detail a second embodiment of the locking mechanism according to the present invention;

Figures 9a-9e illustrate a bottom plan view of the locking mechanism and release spring of the embodiment shown in Figure 8 in operation from activation through release of the locking mechanism;

Figure 10 illustrates a perspective view of the locking mechanism and release spring of the embodiment shown in Figure 8; and

Figure 11 illustrates a plan view of the brake member of the locking mechanism of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in specific detail to the drawings, in which like reference numerals identify similar or identical elements, Figure 1 illustrates a first embodiment of the endoscopic or laparoscopic surgical instrument 1. In its simplest form, device 1 comprises a handle assembly 2, a body assembly 3, a trigger 12, and an internal locking mechanism assembly (not shown) associated with trigger 12. Handle assembly 2 comprises a pivoting handle 6 and a stationary handle 7 having a barrel portion 8. Body assembly 3 essentially comprises an outer tubular member 22 through which an inner rod member 21 coaxially passes in a slidable arrangement. Outer tube member 22 is secured to barrel portion 8 and remains stationary during operation of the device, so that upon movement of pivoting handle 6, the inner rod 21 reciprocates within tube member 22 to operate a tool mechanism 30 provided at the distal end of the instrument 1. Tool mechanism 30 may comprise any surgical implement, such as scissors device, a grasping device, a forceps device, a retractor device and like mechanisms. Connecting means 9 connects the inner tube member 22 with the pivoting handle 6. Connecting means 9 also provides a rotatable connection means for inner rod 21 during its reciprocating movement within outer tubular member 22, to limit or minimize radial deflection of rod 21 during movement. A rotation knob 18 may be provided which rotates body assembly 3 to orient tool mechanism 30 at various angles to the longitudinal axis.

As best seen in Figures 2 and 3, the locking mechanism assembly provides for retaining the jaw mechanism 30 of the surgical instrument in various

positions by pulling on trigger 12 in a direction toward the handle, or proximal, end of the instrument. Trigger 12 provides a simple and effective means of locking and unlocking the jaw mechanism 30 of the surgical instrument during a surgical procedure using only one hand. The locking mechanism assembly, except for the lower portion of trigger 12, is positioned internally within barrel portion 8 and stationary handle 7 so that none of the mechanism is exposed to environmental conditions.

The locking mechanism assembly includes a trigger 12, a brake 14 which is adapted to pivot with respect to pin 13, and biasing spring 10 which is adapted to bias brake 14 towards the tool mechanism, or distal end, of the instrument 1. Trigger 12 and biasing spring 17 bias the locking mechanism to the unlatched position, and operate in association with latch release spring 15, whose function will be described below.

In use, the surgeon will decide whether or not the distal jaws should lock in a closed configuration upon tissue. If not, trigger 12 remains in its distal, rest position and the jaws freely open and close upon manual operation of pivotal handle 6. Conversely, if the surgeon desires that the jaws should lock, the surgeon draws trigger 12 proximally with his finger. In the embodiment shown in Figs. 1-3, trigger 12 is moved linearly in a plane parallel to the inner rod 21 and the longitudinal axis of the instrument 1. This proximal movement of trigger 12 allows brake 14 to pivot in a distal direction under the influence of spring 10 such that the aperture 24 (See Fig. 12) in the upwardly extending portion of brake 14 becomes eccentric with respect to center rod 21 which passes therethrough. This eccentricity causes rod 21 to be frictionally retained with respect to distal motion of rod 21. However, rotation of pivotal handle 6 towards stationary handle 7, which translates to proximal motion of center rod 21, is unencumbered since the brake 14 has freedom of motion in the proximal direction, as against compression spring 10. In this manner, the position of the jaws may be adjusted incrementally. Since the spring force of spring 17 is greater than the spring force of spring 10, retention of rod 21 results in locking of the jaws 30 only when latch spring 15 engages recess 42 of cam member 40 which is integral to trigger 12. (See Figure 4).

Turning to Figs. 4a-4e, the operation of latch release spring 15 is illustrated wherein latch spring 15 is adapted to ride against the upwardly projecting diagonal cam member 40 on trigger 12. As seen in Figs. 4a-4c, trigger 12 moves proximally so that latch release spring 15 rides along cam surface 41 until the distal end of the cam surface is reached, at which point the spring bias of the latch release spring 15 brings latch release spring 15 into a locking engagement within triangular recess 42 cut into the cam member 40 on trigger 12. It is this engagement of latch release spring 15 with the triangular recess 42 on trigger 12 that maintains the trigger in its proximal position and allows the jaws to lock because, as noted above, this proximal movement of trigger 12 allows brake 14 to pivot distally to engage aperture 24 with rod 21 under the bias of compression spring 10.

When the surgeon wishes to unlock the gripping jaws, he pulls trigger 12 further in the proximal direction. This proximal movement causes latch release spring 15 to contact triangular release 43 cam at the front edge of trigger 12, as seen in Fig. 4d. This moves the latch release spring 15 over cam member 40, and allows it to then ride on cam surface 44 on the opposite side of the cam member 40 (see Fig. 4e) when the surgeon releases his finger from trigger 12. Thus, trigger 12 is allowed to move distally under the bias of compression spring 17, thereby moving brake 14 in a proximal direction such that the aperture 24 becomes concentrically aligned with center rod 21.

Figure 5 illustrates the trigger 12 of one embodiment of the invention showing the location of diagonal cam member 40 and triangular release cam 43. Also shown is the cavity 46 for compression spring 17 (not shown).

Figure 6 illustrates a side view of one embodiment of the latch release spring 15. Figure 6 further illustrates mounting plate 81 and latch release spring finger 82.

Figure 7 illustrates another embodiment of the endoscopic or laparoscopic surgical instrument 100, which is identical to the embodiment of Figure 1 except that trigger 12 is eliminated and a different tool mechanism is illustrated. In this embodiment, the locking mechanism is incorporated internally within the handle assembly and the body assembly, and not as an independent mechanism as in the embodiment of Figure 1, to allow for the locking mechanism to lock the surgical instrument only in a fully closed position. Upon movement of pivoting handle 116, the inner rod assembly 121 reciprocates within outer tube assembly 119 to operate a tool mechanism 130 provided at the distal end of the instrument 100. This tool mechanism 130 may comprise any surgical implement, such as a scissors device, a grasper device, a forceps device, a retractor device and like device mechanisms. A rotation knob 126 may be provided which rotates body assembly 113 to orient the tool mechanism at various angles to the longitudinal axis.

In use, when the surgeon desires that the jaws should lock, the surgeon draws pivoting handle 116 toward stationary handle 117 with his thumb. This movement of pivoting handle 116 allows latch re-

lease spring 140 to lock in triangular recess 152 of cam member 150 on locking block 141.

Turning to the operation of latch release spring 140, as best seen in Figs. 9a-9e, this spring is adapted to ride against diagonal cam surface 151 on locking block 141. As locking block 141 moves proximally, latch release spring 140 pivots into locking engagement within a triangular recess 152 of member 150 on locking block 141. It is this engagement of latch release spring 140 with the triangular recess 152 on locking block 141 that maintains the pivoting handle and the jaw mechanism in the locked position.

When the surgeon wishes to unlock the gripping jaws, he squeezes pivoting handle 116 further which causes latch release spring 140 to contact a triangular release cam 153 at the front edge of locking block 141. Inner rod 121 is preferably constructed as a two-piece member as shown. Rod 121a is secured to rod 121b by pin 160 which rides in slot 162, which allows rod 121b to be further drawn proximally even though the jaws of tool mechanism are fully closed. This also serves as a safety mechanism to prevent damage to the tissue positioned between the jaw members. As the surgeon squeezes the handles together, latch release spring 140 pivots to allow it to then ride on the opposite side 154 of the cam member 150 when the surgeon releases pressure from pivoting handle 116. Thus, locking block 141 is allowed to move distally under the bias of spring 142.

Figures 9a-9e illustrate the bottom of locking block 141 including diagonal cam member 150 having cam surface 151, triangular recess 152, release cam surface 154, and triangular release cam 153. Figures 9a-9e show block 141 operating in a manner identical to that shown in Figs. 4a-4e, where spring 140 moves along surface 151 into engagement with recess 152 to lock the jaws. To release the block 141, the surgeon further pulls on pivoting handle 116 to engage spring 140 with cam 153, which allows spring 140 to ride along surface 154 until block 141 is fully disengaged.

The instrument of the present invention may be used for electrocautery purposes in addition to its cutting and grasping features. In this regard, as seen in Fig. 8, a coating 123 for insulation purposes may be provided over outer tube 119.

The insulation coating is necessary to avoid damage to surrounding tissue, thus providing the electrocautery feature at only the jaw mechanism. The insulation coating must conform to the shape of the body assembly to allow for smooth passage of the instrument through a cannula of a trocar to the surgical site, without snagging or abrading. Damage to the insulation coating may lead to an electrical path from the instrument to the cannula (typically constructed of a metallic material), thus damaging the surrounding tissue and exposing the surgical teams to an electrical shock hazard. Therefore, the insulation must maintain its integrity during use and be resistant to abrasion. Furthermore, it must be uniform in thickness about the instrument to eliminate friction or abrasion as the instrument passes through a trocar assembly in a smooth and unobstructed manner.

In this regard, while heat shrink tubing, and coatings such as PFTE (Teflon), urethane and epoxies may provide suitable insulation for the surgical instrument having an electrocautery feature, in the preferred embodiment of the present invention the body assembly is coated with a polymer such as diparaxylylene, which is a completely linear and highly crystalline material, manufactured by Union Carbide Corporation and known as parylene. Parylene provides a pin-hole free coating which is biocompatible and completely conforms to the shape of the instrument in a uniform manner. Parylene is applied in a vapor-deposition process in a vacuum chamber. During the application of parylene, the parylene layer builds uniformly with equal thickness on the entire surface of the instrument.

Claims

1. An endoscopic or laparoscopic surgical instrument (1) comprising:

   a handle assembly (2) including a barrel portion (8), stationary handle (7) and a pivoting handle (6);

   a body assembly (3) comprising a pair of coaxial members attached at one end to said handle assembly, including an inner rod member (21) slidable within an outer tube member (22) in response to movement of said pivoting handle of said handle assembly, said body assembly terminating at an end remote from said handle assembly in a reciprocatingly movable tool mechanism (30);

   means (10, 14) associated with said barrel portion of said handle assembly for locking said tool mechanism and, means (12, 17) for actuating said locking means;

   characterised in that:

   the locking means is positioned within the barrel portion and the actuating means is movable in a first direction a first distance to activate said locking means and lock said tool mechanism, and movable a second distance in said first direction to deactivate said locking means and release said tool mechanism.

2. A surgical instrument according to Claim 1, wherein said locking means comprises means (14) engagable with said inner rod member.

3. A surgical instrument according to Claim 1 or 2, wherein said locking means comprises a pivoting braking means (14) for engaging said inner rod, a latch spring (15) and a trigger mechanism (12) for activating and deactivating said braking means.

4. Surgical instrument according to Claim 3, wherein said braking means (14) includes an aperture concentrically aligned with said inner rod member (21) when said locking mechanism is disengaged, said aperture being eccentric with said inner rod member when said locking mechanism is engaged to frictionally engage said rod member.

5. A surgical instrument according to Claim 3 or 4, wherein said trigger mechanism member includes a camming surface (42) for engaging said latch spring, said braking means pivoting out of engagement with said inner rod when said latch spring is out of engagement with said camming surface, and said latch spring locking said braking means in frictional engagement with said inner rod when said camming surface is engaged with said latch spring.

6. A surgical instrument according to Claim 3, 4 or 5, wherein said braking means (14) permits movement of said inner rod (21) in said first direction when said locking means is engaged, and prevents movement of said inner rod in a second direction opposite to said first direction when said locking means is engaged.

7. A surgical instrument according to any one of the preceding claims, wherein said actuating means comprises a camming member (40) having a retaining notch and a latch spring (15), said latch spring engaging said notch to lock said tool mechanism.

8. A surgical instrument according to Claim 7, wherein said actuating means further comprises a release tab (43) for releasing said latch spring, said release tab engaging said latch spring upon movement of said locking means in said first direction.

9. A surgical instrument according to Claim 7 or 8, said actuating means further comprising a trigger member (12) for advancing said camming member (40) in relation to said latch spring (15) to a locking position.

10. A surgical instrument according to any one of the preceding claims, wherein said locking means is secured to said inner rod member (21) and includes a cam surface which engages a latch spring to lock said tool mechanism.

11. A surgical instrument according to any one of the preceding claims, wherein said pivotable handle (7) activates said inner rod member (21), such that movement of said pivotable handle slidingly reciprocates said inner rod member within said outer tube member.

12. A surgical instrument according to any one of the preceding claims, wherein said actuating mechanism includes a locking block (141) secured to said inner rod member, said block having a camming surface upon which a latch spring (140) rides during movement said first distance, said latch spring (140) engaging a notch (152) in said camming surface to lock said tool mechanism.

13. A surgical instrument according to Claim 12, wherein said locking block (141) is movable a first distance in a first direction to engage said latch spring (140) in said notch (152), and is movable a second distance in said first direction to disengage said latch spring from said notch.

14. A surgical instrument according to any one of the preceding claims, wherein said surgical instrument further comprises an electrical insulating means and an electrocautery means.

Patentansprüche

1. Endoskopisches oder laparoskopisches Chirurgieinstrument (1) mit:
   - einer Griffanordnung (2) mit einem Laufabschnitt (8), einem stationären Griff (7) und einem Drehgriff (6);
   - einer Körperanordnung (3) mit zwei koaxialen Elementen, die an einem Ende der Griffanordnung befestigt sind, die ein inneres Stangenelement (21) aufweist, das gleitend innerhalb eines äußeren Rohrelementes (22) in Ansprechen auf eine Bewegung des Drehgriffes der Griffanordnung verschiebbar ist, wobei die Körperanordnung an einem von der Griffanordnung entfernten Ende in einem hin- und herbewegbaren Werkzeugmechanismus (30) endet;
   - einer Einrichtung (10, 14), die dem Laufabschnitt der Griffanordnung zugeordnet ist und den Werkzeugmechanismus verriegelt und einer Einrichtung (12, 17) zur Betätigung der Verriegelungseinrichtung;

dadurch **gekennzeichnet,** daß:
die Verriegelungseinrichtung innerhalb des Laufabschnittes angeordnet ist und daß die Betätigungseinrichtung in einer ersten Richtung um einen ersten Abstand bewegbar ist, um die Verriegelungseinrichtung zu aktivieren und den Werkzeugmechanismus zu verriegeln, und um einen zweiten Abstand in der ersten Richtung bewegbar ist, um die Verriegelungseinrichtung zu deaktivieren und den Werkzeugmechanismus freizugeben.

2. Chirurgieinstrument nach Anspruch 1, wobei die Verriegelungseinrichtung eine Einrichtung (14) aufweist, die mit dem inneren Stangenelement in Eingriff treten kann.

3. Chirurgieinstrument nach Anspruch 1 oder 2, wobei die Verriegelungseinrichtung eine sich drehende Bremseinrichtung (14) für einen Eingriff mit der inneren Stange aufweist, eine Klinkenfeder (15) und einen Auslösemechanismus (12) zum Aktivieren und Deaktivieren der Bremseinrichtung.

4. Chirurgieinstrument nach 3, wobei die Bremseinrichtung (14) eine Öffnung aufweist, die konzentrisch mit dem inneren Stangenelement (21) ausgerichtet ist, wenn der Verriegelungsmechanismus gelöst ist, wobei die Öffnung exzentrisch zu dem inneren Stangenelement verläuft, wenn der Verriegelungsmechanismus betätigt ist, um mit dem Stangenelement in Reibeingriff zu stehen.

5. Chirurgieinstrument nach Anspruch 3 oder 4, wobei das Auslösemechanismuselement eine Nockenfläche (42) für einen Eingriff mit der Klinkenfeder aufweist, wobei die Bremseinrichtung sich außer Eingriff mit der inneren Stange dreht, wenn die Verriegelungsfeder außer Eingriff mit der Nockenfläche steht und wobei die Verriegelungsfeder die Bremseinrichtung in Reibeingriff mit der inneren Stange verriegelt, wenn die Nockenfläche mit der Klinkenfeder in Eingriff steht.

6. Chirurgieinstrument nach Anspruch 3, 4 oder 5, wobei die Bremseinrichtung (14) eine Bewegung der inneren Stange (21) in der ersten Richtung erlaubt, wenn die Verriegelungseinrichtung betätigt ist und eine Bewegung der inneren Stange in einer zweiten Richtung entgegengesetzt zu der ersten Richtung verhindert, wenn die Verriegelungseinrichtung betätigt ist.

7. Chirurgieinstrument nach einem der vorstehenden Ansprüche, wobei die Betätigungseinrichtung ein Nockenelement (40) mit einer Haltenut und eine Klinkenfeder (15) aufweist, die mit der Nut in Eingriff steht, um den Werkzeugmechanismus zu verriegeln.

8. Chirurgieinstrument nach Anspruch 7, wobei die Betätigungseinrichtung ferner eine Freigabelasche (43) zum Freigeben der Klinkenfeder aufweist, wobei die Freigabelasche mit der Klinkenfeder auf eine Bewegung der Verriegelungseinrichtung in der ersten Richtung hin in Eingriff steht.

9. Chirurgieinstrument nach Anspruch 7 oder 8, wobei die Betätigungseinrichtung ferner ein Auslöseelement (12) zum Nach-vorne-Bewegen des Nockenelementes (40) bezogen auf die Klinkenfeder (15) in eine Verriegelungsposition umfaßt.

10. Chirurgieinstrument nach einem der vorstehenden Ansprüche, wobei die Verriegelungseinrichtung an dem inneren Stangenelement (21) befestigt ist und eine Nockenfläche aufweist, die mit einer Klinkenfeder in Eingriff steht, um den Werkzeugmechanismus zu verriegeln.

11. Chirurgieinstrument nach einem der vorstehenden Ansprüche, wobei der Drehgriff (7) das innere Stangenelement (21) aktiviert, so daß eine Bewegung des Drehgriffes das innere Stangenelement innerhalb des äußeren Rohrelementes gleitend hin- und herbewegt.

12. Chirurgieinstrument nach einem der vorstehenden Ansprüche, wobei der Betätigungsmechanismus einen Verriegelungsblock (141) aufweist, der an dem inneren Stangenelement befestigt ist und eine Nockenfläche aufweist, auf der eine Klinkenfeder (140) während einer Bewegung um den ersten Abstand läuft, wobei die Klinkenfeder (140) mit einer Nut (152) in der Nockenfläche in Eingriff steht, um den Werkzeugmechanismus zu verriegeln.

13. Chirurgieinstrument nach Anspruch 12, wobei der Verriegelungsblock (141) um einen ersten Abstand in einer ersten Richtung bewegbar ist, um einen Eingriff zwischen der Klinkenfeder (140) und der Nut (152) herzustellen, und um einen zweiten Abstand in der ersten Richtung bewegbar ist, um die Klinkenfeder aus der Nut zu lösen.

14. Chirurgieinstrument nach einem der vorstehenden Ansprüche, wobei das Chirurgieinstrument

ferner eine elektrische Isolationseinrichtung und eine elektrische Diathermieeinrichtung aufweist.

Revendications

1. Instrument (1) chirurgical endoscopique et coelioscopique comprenant :

un assemblage (2) de poignée incluant une portion (8) de barillet, une poignée (7) stationnaire et une poignée (6) pivotante ;

un assemblage (3) de corps comprenant une paire de membres coaxiaux attachés à une extrémité dudit assemblage de poignée incluant un membre (21) en forme de barreau intérieur mobile en glissement dans un membre (22) de tube extérieur en réponse à un mouvement de ladite poignée pivotante dudit assemblage de poignée, ledit assemblage de corps se terminant à une extrémité proche de ladite poignée d'assemblage dans un mécanisme d'outil mobile en va-et-vient (30) ;

un moyen (10) associé à ladite portion de barillet dudit assemblage de poignée pour verrouiller ledit mécanisme d'outil et,

un moyen (12, 17) pour actionner ledit moyen de verrouillage ;

caractérisé en ce que :

le moyen de verrouillage est positionné dans la portion de barillet et le moyen d'actionnement est mobile dans une première direction d'une première distance pour actionner ledit moyen de verrouillage et verrouiller ledit mécanisme d'outil et mobile d'une seconde distance dans ladite première direction pour désactiver ledit moyen de verrouillage et libérer ledit mécanisme d'outil.

2. Instrument chirurgical selon la revendication 1 dans lequel ledit moyen de verrouillage comprend un moyen (14) qui peut s'engager avec ledit membre en forme de barreau intérieur.

3. Instrument chirurgical selon la revendication 1 ou 2, dans lequel ledit moyen de verrouillage comprend un moyen (14) de freinage pivotant pour engager ledit barreau intérieur, un ressort (15) à loquet et un mécanisme (12) à déclenchement pour activer et désactiver ledit moyen de freinage.

4. Instrument chirurgical selon la revendication 3, dans lequel ledit moyen (14) de freinage inclut une ouverture alignée concentriquement avec ledit membre (21) en forme de barreau intérieur lorsque ledit moyen de verrouillage est désengagé, ladite ouverture étant excentrique avec ledit membre en forme de barreau intérieur lorsque ledit mécanisme de verrouillage est engagé pour engager en friction ledit membre en forme de barreau.

5. Instrument chirurgical selon la revendication 3 ou 4, dans lequel ledit membre de mécanisme à déclenchement inclut une surface (42) à came pour engager ledit ressort à loquet, ledit moyen de freinage pivotant hors d'un engagement avec ledit barreau intérieur lorsque ledit ressort à loquet est hors de l'engagement avec ladite surface à came, et ledit ressort à loquet verrouillant ledit moyen de freinage en engagement en friction avec ledit barreau intérieur lorsque ladite surface à came est engagée avec ledit ressort à loquet.

6. Instrument chirurgical selon la revendication 3, 4 ou 5, dans lequel ledit moyen (14) de freinage permet le mouvement dudit barreau (21) intérieur dans ladite première direction lorsque ledit moyen de verrouillage est engagé, et empêche le mouvement dudit barreau intérieur dans une seconde direction opposée à ladite première direction lorsque ledit moyen de verrouillage est engagé.

7. Instrument chirurgical selon l'une quelconque des revendications précédentes, dans lequel ledit moyen d'actionnement comprend un membre (40) à came ayant une encoche de rétention et un ressort (15) à loquet, ledit ressort à loquet s'engageant dans ladite encoche pour verrouiller ledit mécanisme d'outil.

8. Instrument chirurgical selon la revendication 7, dans lequel ledit moyen d'actionnement comprend de plus une patte de libération engageant ledit ressort à loquet lors du mouvement dudit moyen de verrouillage dans ladite première direction.

9. Instrument chirurgical selon la revendication 7 ou 8, ledit moyen d'actionnement comprenant de plus un membre (12) à déclenchement pour avancer ledit membre (40) à came par rapport audit ressort (15) à loquet en position de verrouillage.

10. Instrument chirurgical selon l'une quelconque des revendications précédentes, dans lequel ledit moyen de verrouillage est fixé audit membre (21) en forme de barreau intérieur et inclut une surface à came qui engage un ressort à loquet pour verrouiller ledit mécanisme d'outil.

11. Instrument chirurgical selon l'une quelconque des revendications précédentes, dans lequel

ladite poignée pivotante (7) actionne ledit membre (21) en forme de barreau intérieur de sorte qu'un mouvement de ladite poignée pivotante fait bouger en va-et-vient en glissement ledit membre en forme de barreau intérieur dans ledit membre de tube extérieur.

12. Instrument chirurgical selon l'une quelconque des revendications précédentes, dans lequel ledit mécanisme d'actionnement inclut un bloc (141) de verrouillage fixé audit membre de barreau interne, ledit bloc ayant une surface à came sur laquelle un ressort (140) à loquet chevauche pendant le mouvement de ladite première distance, ledit ressort (140) à loquet s'engageant dans ladite surface à came pour verrouiller ledit mécanisme d'outil.

13. Instrument chirurgical selon la revendication 12, dans lequel ledit bloc de verrouillage (141) est mobile d'une première distance dans une première direction pour engager ledit ressort (140) à loquet dans ladite encoche (152), et est mobile d'une seconde distance dans ladite première direction pour désengager ledit ressort à loquet de ladite encoche.

14. Instrument chirurgical selon l'une quelconque des revendications précédentes, dans lequel ledit instrument chirurgical comprend de plus un moyen d'isolation électrique et un moyen d'électrocautérisation.

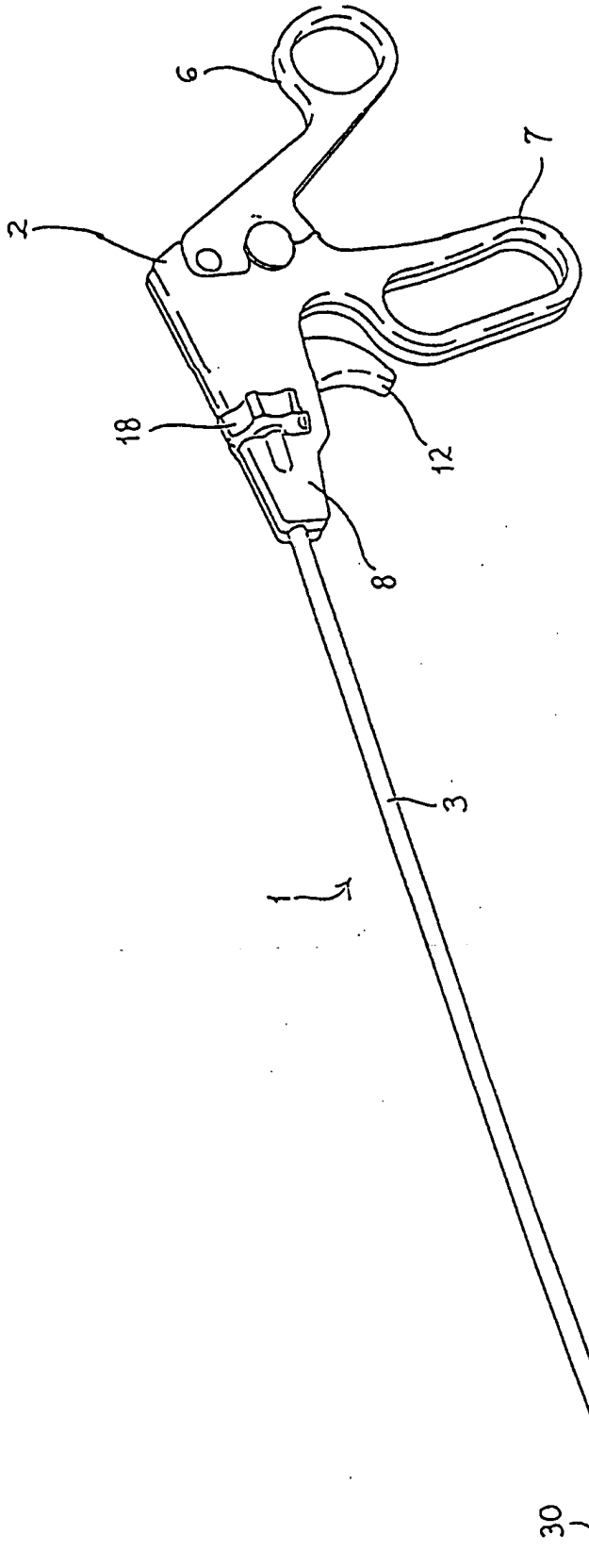

FIG. 1

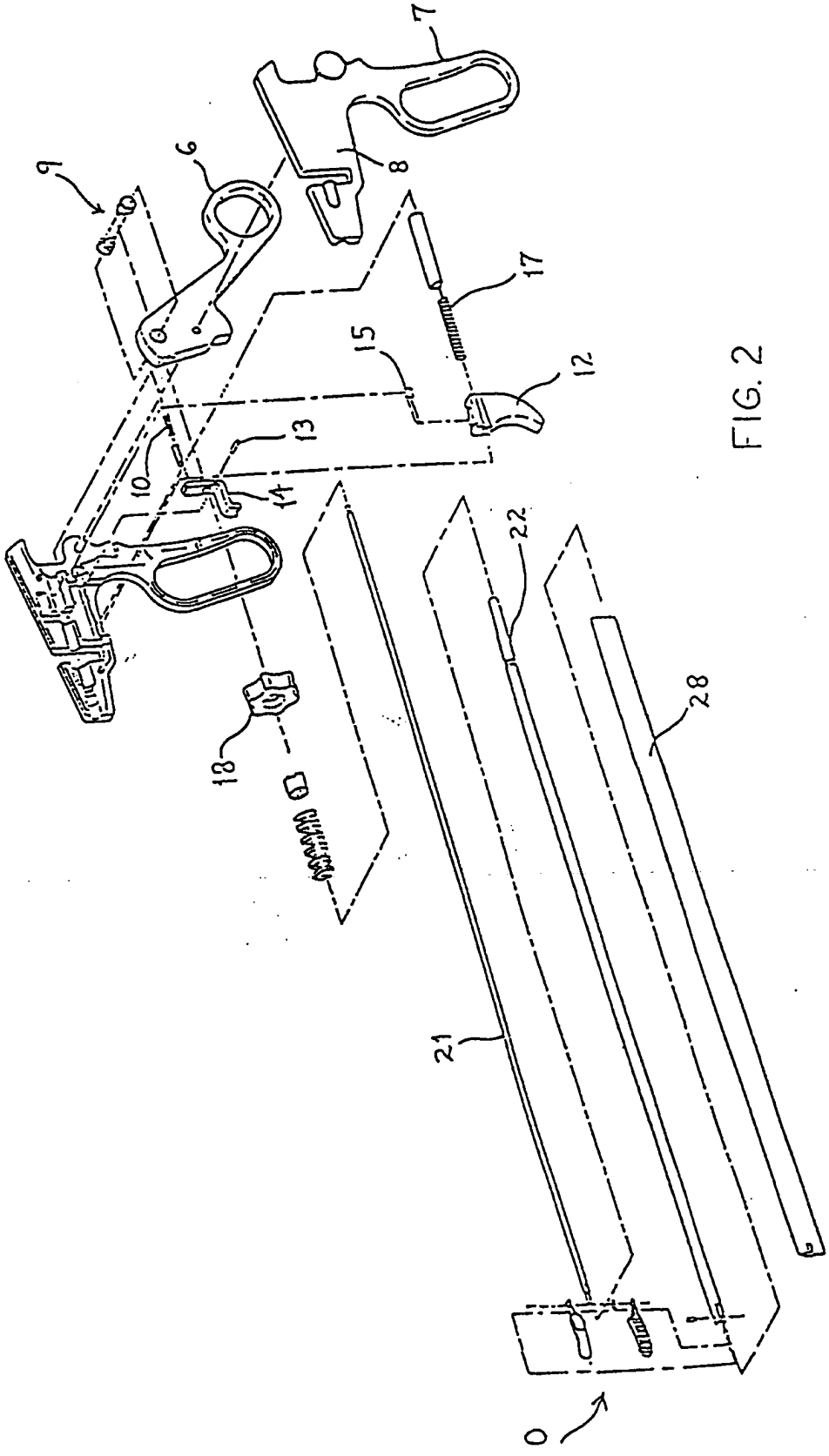

FIG. 2

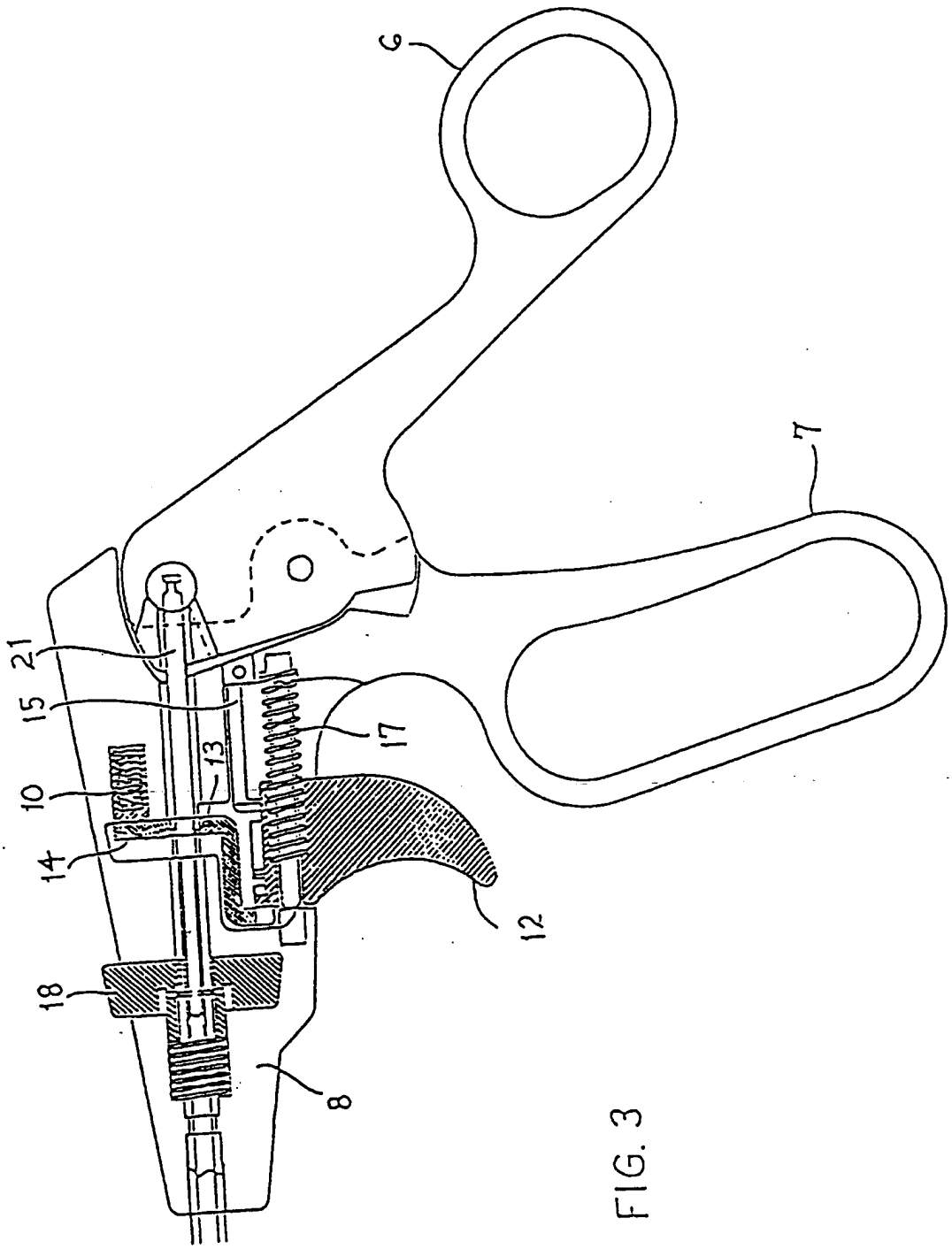

FIG. 3

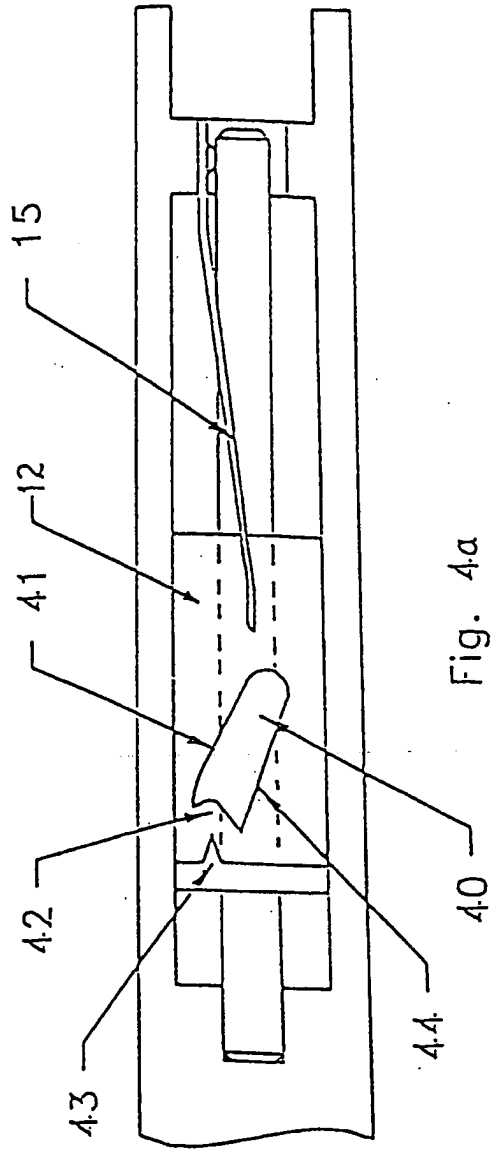

Fig. 4a

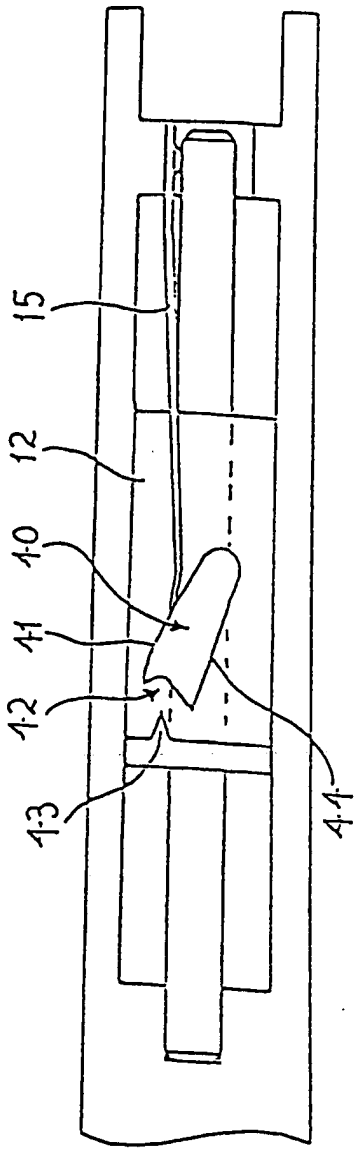

Fig. 4b

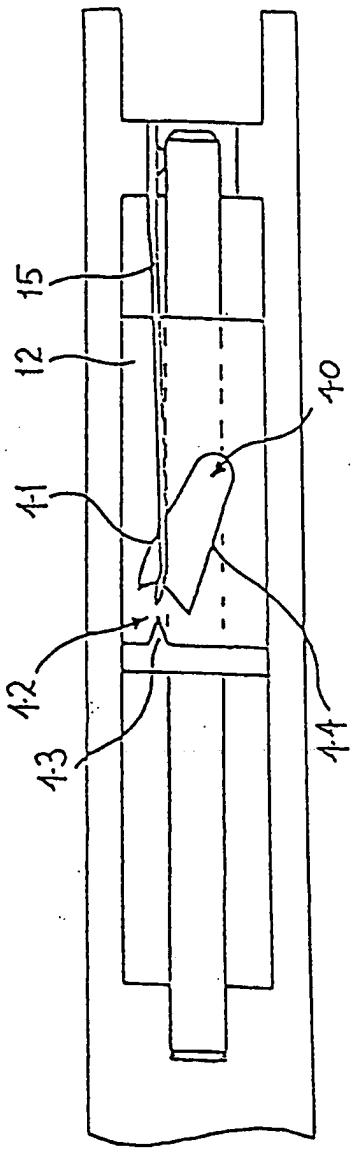

Fig. 1c

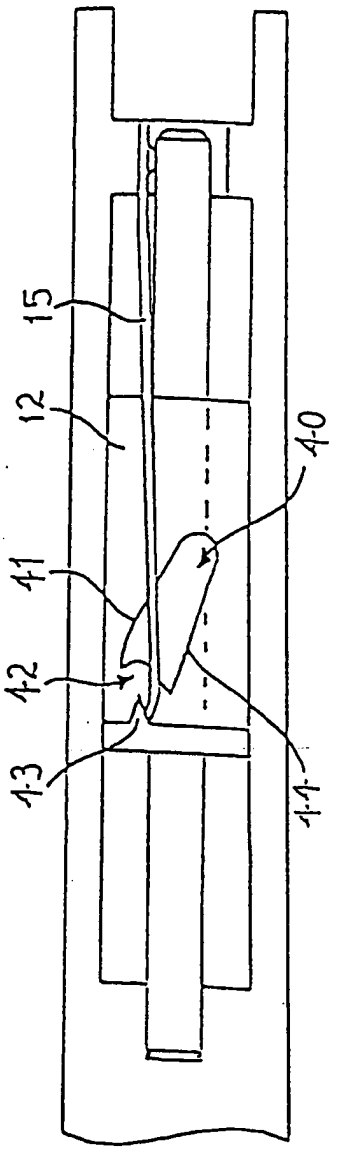

Fig. 4d

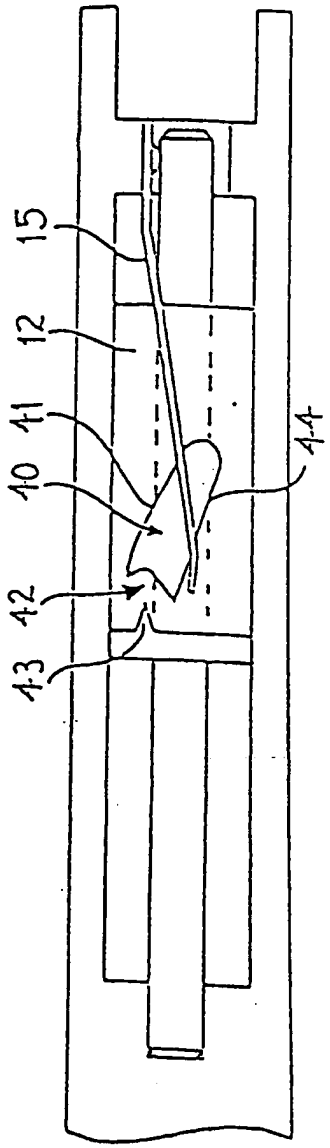

Fig. 4c

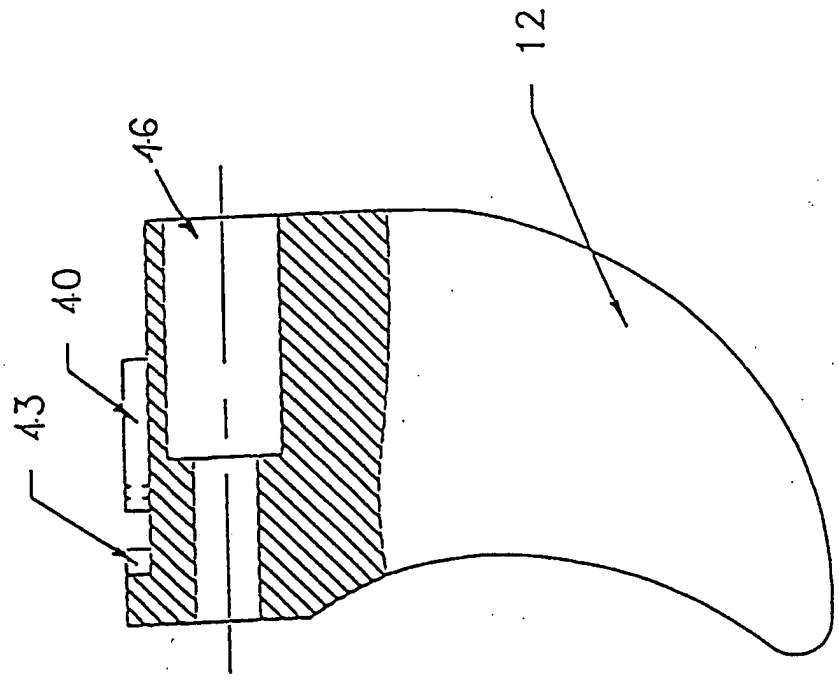

Fig. 5

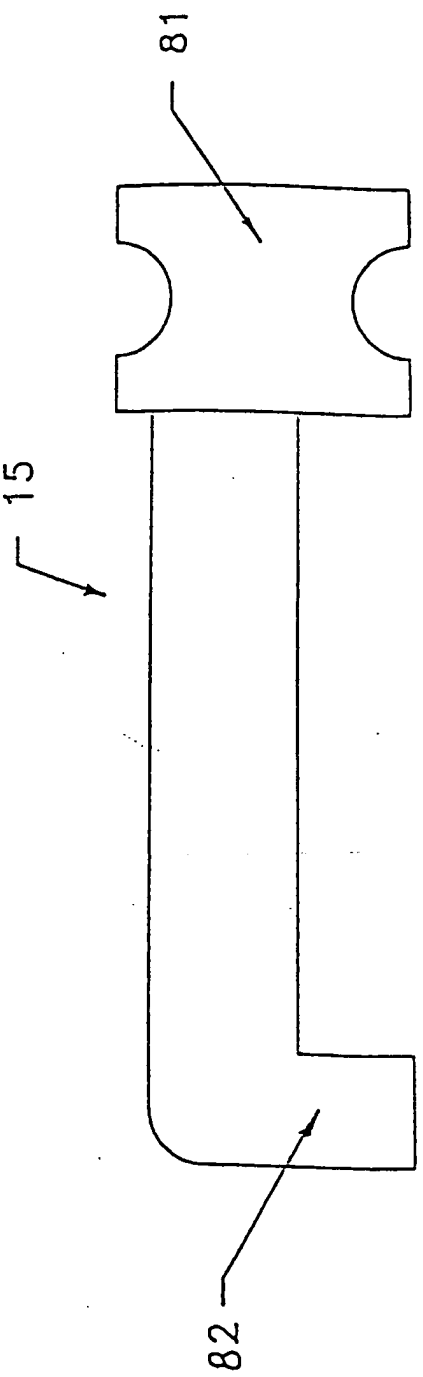

Fig. 6

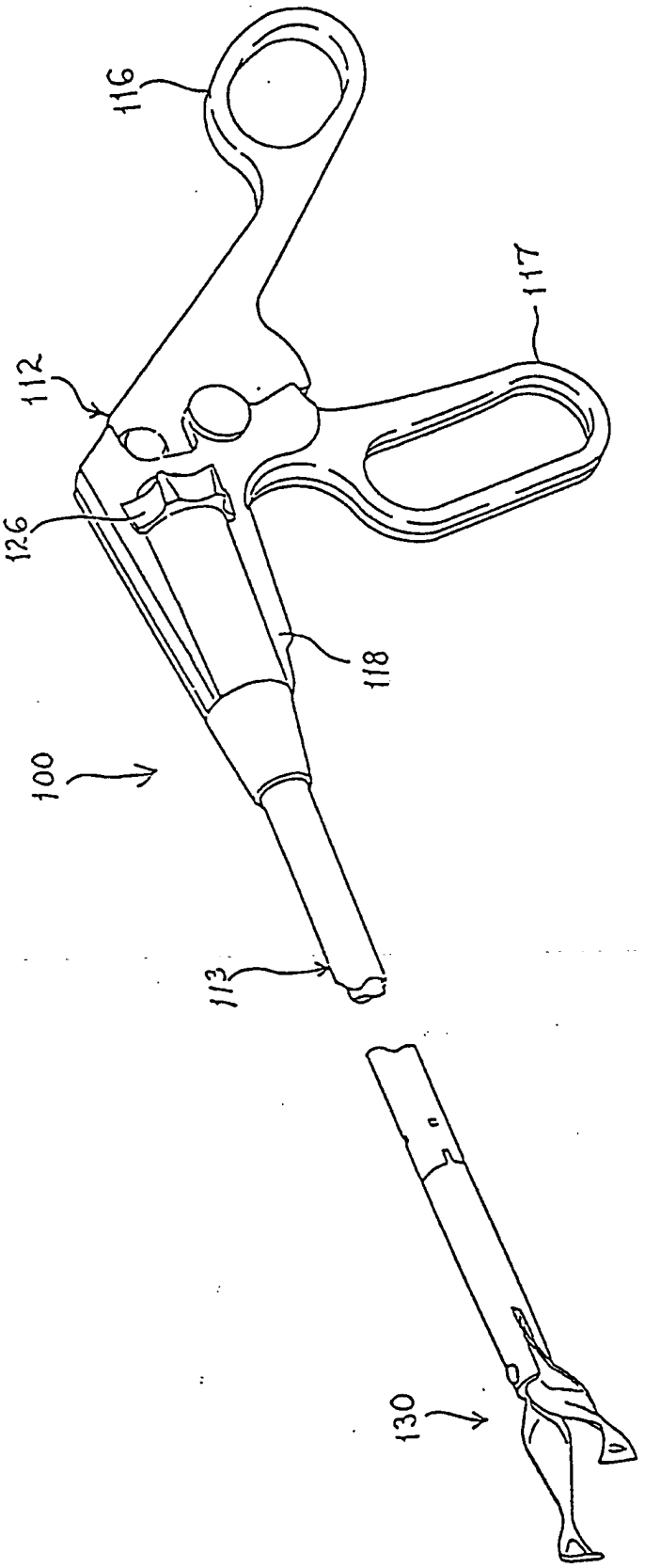

FIG. 7

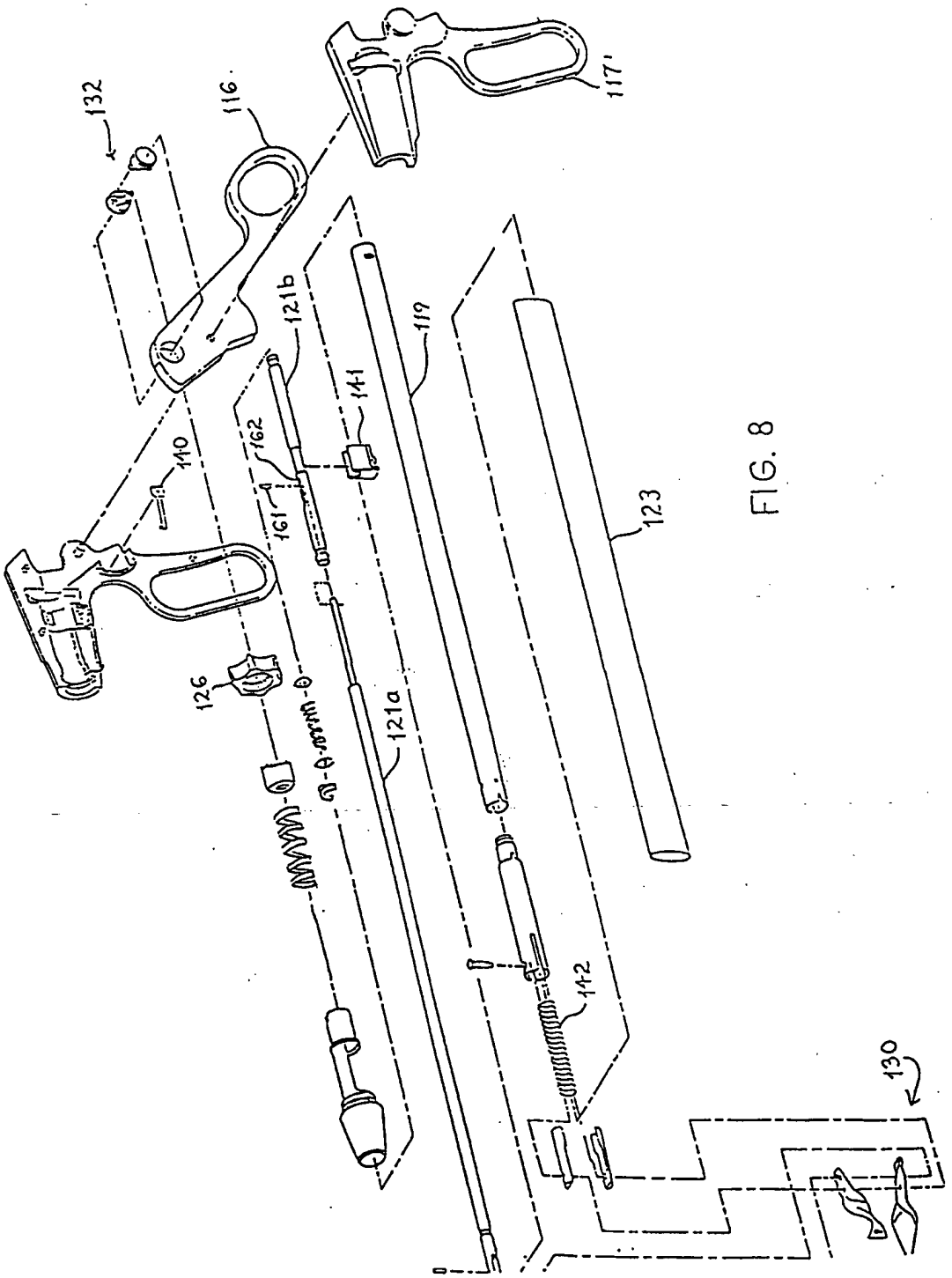

FIG. 8

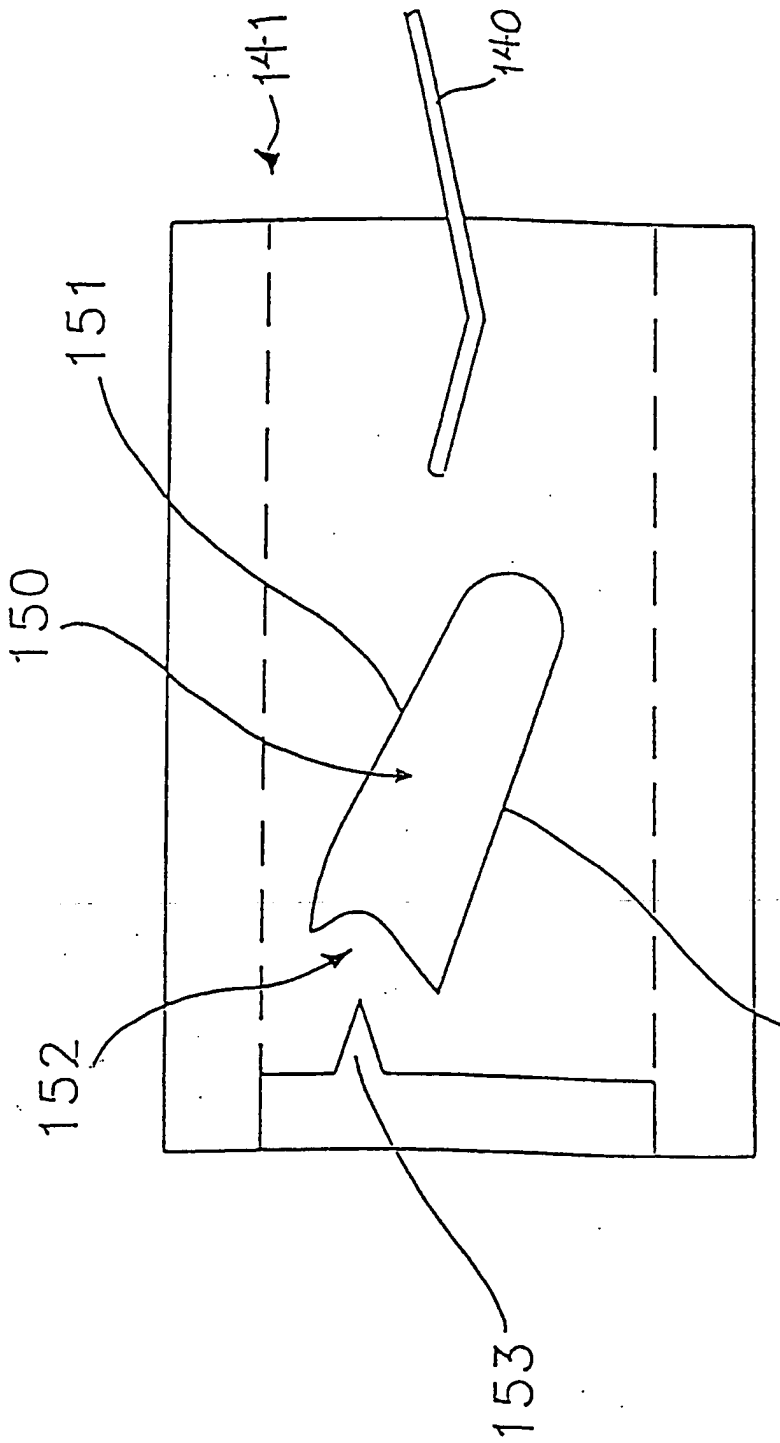

Fig. 9a

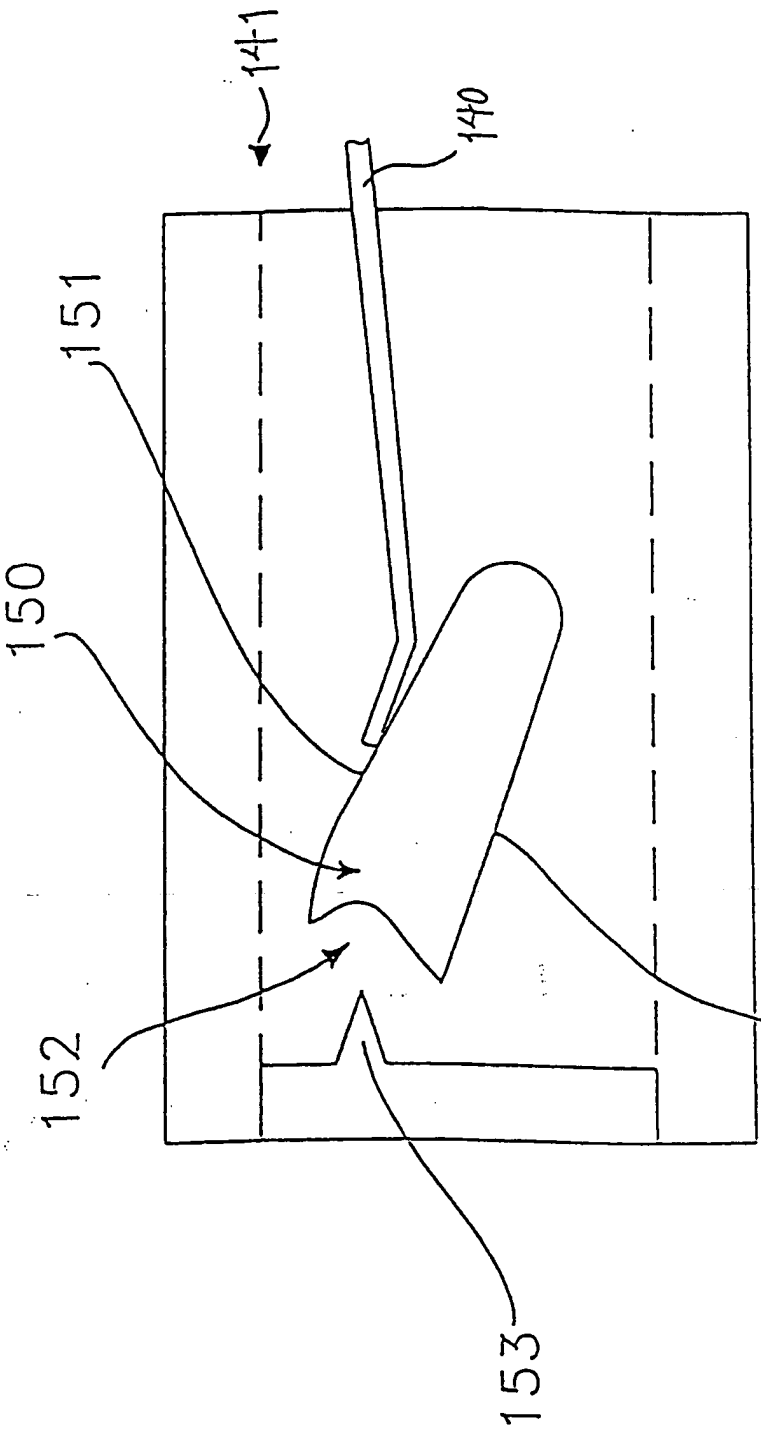

Fig. 9b

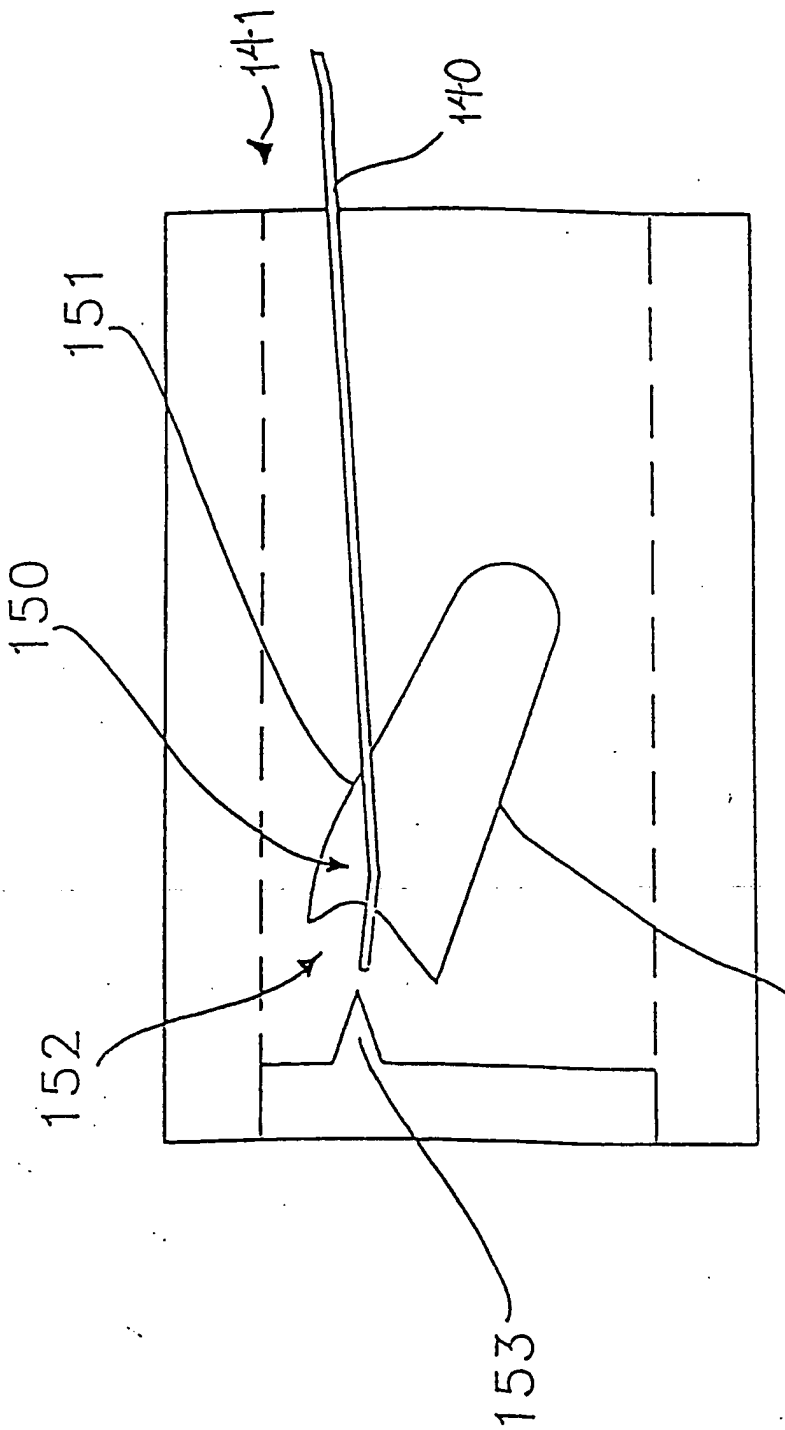

Fig. 9c

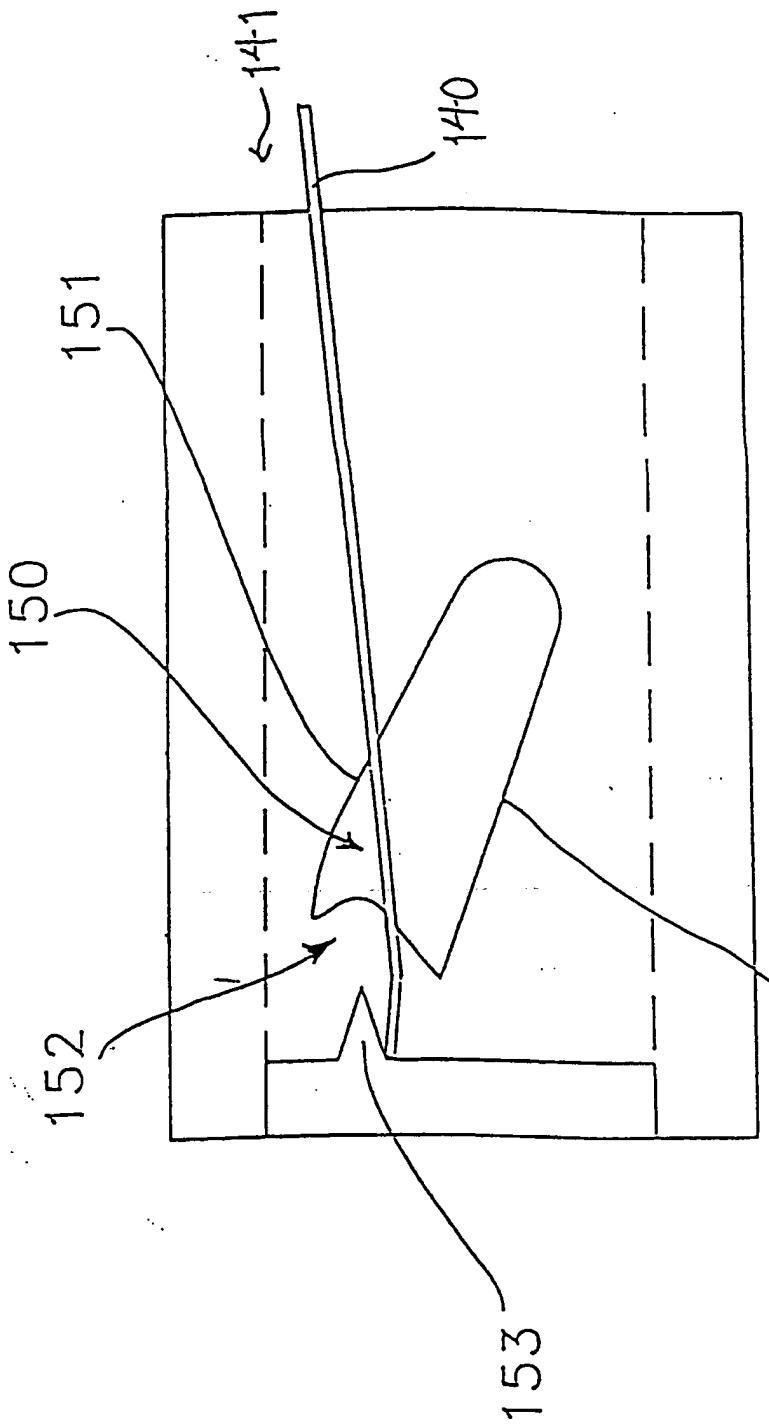

Fig. 9d

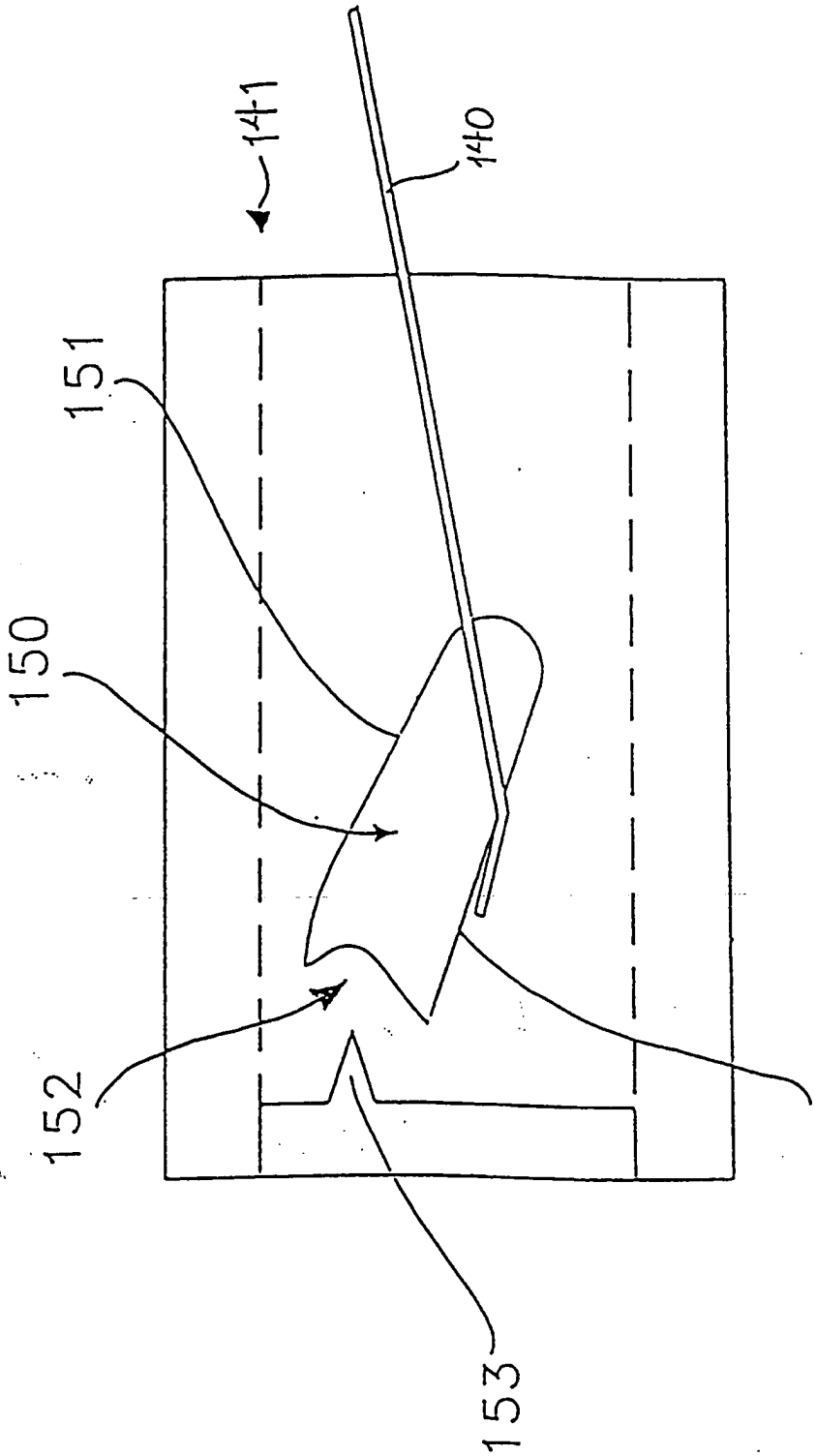

Fig. 9e

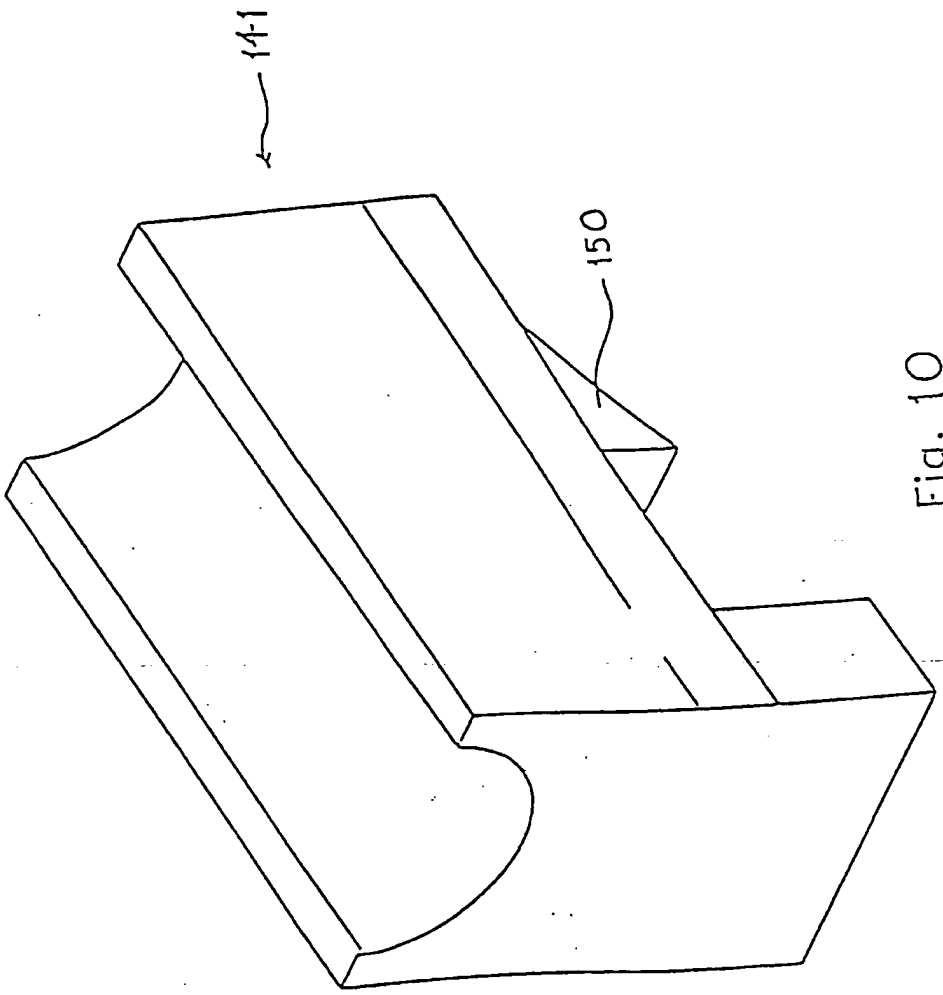

Fig. 10

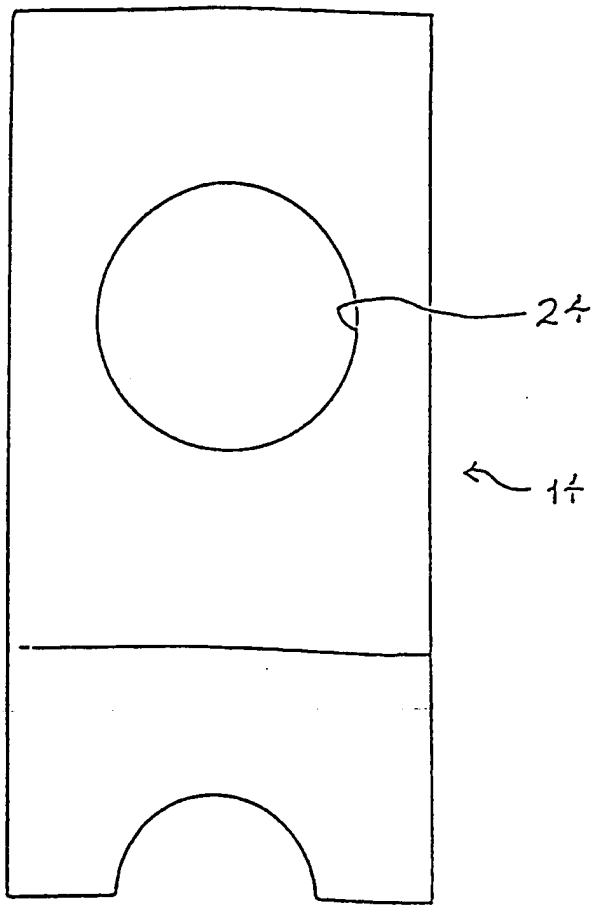

FIG. 11